We Claim:

1. A biologically active microparticle composition comprising:

microparticles that comprise (a) a polymer selected from the group consisting of a poly(α-hydroxy acid), a polyhydroxy butyric acid, a polycaprolactone, a polyorthoester, a polyanhydride, and a polycyanoacrylate; and (b) a first detergent portion that is bound to the polymer; and

a complex adsorbed on the surface of the microparticles, said complex comprising (a) a first biologically active macromolecule and (b) a second detergent portion,

wherein the first detergent portion and the second detergent portion comprise the same detergent or different detergents, and wherein the first biologically active macromolecule is selected from the group consisting of a polypeptide, a polynucleotide, a polynucleoside, an antigen, a pharmaceutical, a hormone, an enzyme, a transcription or translation mediator, an intermediate in a metabolic pathway, an immunomodulator, and an adjuvant.

2. The microparticle composition of claim 1, wherein the polymer comprises a poly(α-hydroxy acid) selected from the group consisting of poly(L-lactide), poly(D,L-lactide) and poly(D,L-lactide-co-glycolide).

3. The microparticle composition of claim 1, wherein the polymer comprises poly(D,L-lactide-co-glycolide).

4. The microparticle composition of claim 3, wherein the poly(D,L-lactide-co-glycolide) has a lactide/glycolide molar ratio ranging from 30:70 to 70:30 and a molecular weight ranging from 10,000 to 100,000 Daltons.

5. The microparticle composition of claim 3, wherein the poly(D,L-lactide-co-glycolide) has a lactide/glycolide molar ratio ranging from 40:60 to 60:40 and a molecular weight ranging from 30,000 Daltons to 70,000 Daltons.

6. The microparticle composition of claim 1, wherein the first and second detergent portions comprise the same detergent.

7. The microparticle composition of claim 6, wherein the first and second detergent portions comprise a cationic detergent.

8. The microparticle composition of claim 1, wherein the first and second detergent portions comprise different detergents.

9. The microparticle composition of claim 8, wherein the first detergent portion comprises a nonionic detergent and the second detergent portion comprises a cationic detergent.

10. The microparticle composition of claim 9, wherein the first detergent portion comprises PVA and the second detergent portion comprises CTAB.

11. The microparticle composition of claim 1, wherein the first biologically active macromolecule is a polypeptide or a polynucleotide.

12. The microparticle composition of claim 1, wherein the first biologically active macromolecule is an antigen selected from HIV antigens, meningitis B antigens, streptococcus B antigens and Influenza A hemagglutinin antigens.

13. The microparticle composition of claim 12, wherein the HIV antigen is selected from the group consisting of gp120, gp140, p24gag, p55gag.

14. The microparticle composition of claim 1, wherein the first biologically active macromolecule is a polynucleotide that encodes an antigen selected from the group consisting of gp120, gp140, p24gag, p55gag, and Influenza A hemagglutinin antigen.

15. The microparticle composition of claim 1, wherein the first biologically active macromolecule is a member selected from the group consisting of a plasmid, an ELVIS vector, and an RNA vector construct.

16. The microparticle composition of claim 1, further comprising a second biologically active macromolecule selected from the group consisting of a polypeptide, a polynucleotide, a polynucleoside, an antigen, a pharmaceutical, a hormone, an enzyme, a transcription or translation mediator, an intermediate in a metabolic pathway, an immunomodulator, and an adjuvant.

17. The microparticle composition of claim 16, wherein the second biologically active macromolecule is an adjuvant.

18. The microparticle composition of claim 17, wherein the adjuvant is a member selected from the group consisting of CpG oligonucleotides, LTK63, LTR72, MPL, and an aluminum salt.

19. The microparticle composition of claim 17, wherein the adjuvant is aluminum phosphate.

20. The microparticle composition of claim 1, wherein the polymer comprises a poly(α-hydroxy acid) selected from the group consisting of poly(L-lactide), poly(D,L-lactide) and poly(D,L-lactide-co-glycolide), wherein the first and second detergent portions comprise a cationic detergent, and wherein the first biologically active macromolecule is a polynucleotide.

21. The microparticle composition of claim 1, wherein the polymer comprises a poly(D,L-lactide-co-glycolide), wherein the first and second detergent portions comprise CTAB, and wherein the first biologically active macromolecule is a polynucleotide which encodes an antigen selected from the group consisting of an HIV antigen, a meningitis B antigen, a streptococcus B antigen and a Influenza A hemagglutinin antigen.

22. The microparticle composition of claim 21, wherein the antigen is an HIV antigen selected from gp120, gp140, p24gag and p55gag.

23. The microparticle composition of claim 22, wherein the first biologically active macromolecule is pCMV-p55gag.

24. The microparticle composition of claim 20, wherein the first detergent portion and the second detergent portion comprise the same cationic detergent, and wherein the first detergent portion that is bound to the polymer comprises about 10-90% of the total detergent in the composition.

25. The microparticle composition of claim 24, wherein the first detergent portion that is bound to the polymer comprises about 10-60% of the total detergent in the composition.

26. The microparticle composition of claim 25, wherein the cationic detergent is CTAB.

27. The microparticle composition of claim 10, wherein the polymer comprises a poly(α-hydroxy acid) selected from the group consisting of poly(L-lactide), poly(D,L-lactide) and poly(D,L-lactide-co-glycolide), and wherein the first biologically active macromolecule is a polynucleotide.

28. The microparticle composition of claim 1, further comprising a pharmaceutically acceptable excipient.

29. Use of the microparticle composition of claim 28 for diagnosis of a disease.

30. Use of the microparticle composition of claim 28 for treatment of a disease.

31. Use of the microparticle composition of claim 28 for a vaccine.

32. Use of the microparticle composition of claim 28 for raising an immune response.

33. A method of delivering a therapeutically effective amount of a biologically active macromolecule to a vertebrate subject, said method comprising the step of administering to the vertebrate subject the microparticle composition of claim 28.

34. A method of producing a microparticle composition, said method comprising:

(a) forming an emulsion comprising (i) a polymer selected from the group consisting of a poly(α-hydroxy acid), a polyhydroxy butyric acid, a polycaprolactone, a polyorthoester, a polyanhydride, and a polycyanoacrylate, (ii) an organic solvent, (iii) a detergent and (iv) water; and

(b) removing the organic solvent from the emulsion to form microparticles;

wherein about 10-90% of the total detergent in the microparticle composition is bound to the microparticles and the remainder is unbound, and wherein said microparticles are not subjected to a washing step.

35. The method of claim 34, wherein the emulsion is a water-in-oil-in-water emulsion that is formed by a process comprising:

(a) emulsifying an organic phase comprising the polymer and the organic solvent with a first aqueous phase comprising water to form a water-in-oil emulsion; and

(b) emulsifying a second aqueous phase comprising the cationic detergent and water with the emulsion formed in step (a) to form a water-in-oil-in-water emulsion.

36. The method of claim 34, wherein a cross-flow filtration step is performed after removing the organic solvent.

37. The method of claim 36, wherein the detergent is a cationic detergent that is provided in the emulsion at a weight to weight detergent to polymer ratio of from about 0. 05:1 to about 0.5:1.

38. The method of claim 37, wherein the cationic detergent is provided in the emulsion at a weight to weight detergent to polymer ratio of from about 0.1:1 to about 0.5:1, wherein the polymer is poly(D,L-lactide-co-glycolide), and wherein the cationic detergent is CTAB.

39. The method of claim 34, wherein the detergent is a cationic detergent that is provided in the emulsion at a weight to weight detergent to polymer ratio of from about 0.001:1 to about 0.05:1.

40. The method of claim 39, wherein the cationic detergent is provided in the emulsion at a weight to weight detergent to polymer ratio of from about 0.002:1 to about 0.04:1, wherein the cationic detergent is CTAB, wherein the polymer is poly(D,L-lactide-co-glycolide), and wherein the microparticles are not subjected to a step to remove excess CTAB from the composition.

41. The method of claim 34, wherein the polymer is a poly(D,L-lactide-co-glycolide) having a lactide/glycolide molar ratio ranging from 40:60 to 60:40 and a molecular weight ranging from 30,000 Daltons to 70,000 Daltons.

42. A microparticle composition formed by the process of claim 34.

43. A method of producing a biologically active microparticle composition, said method comprising:

(a) providing a microparticle composition by the method of claim 34; and

(b) incubating the microparticle composition with a biologically active macromolecule.

44. The method of claim 43, wherein the biologically active macromolecule is a polynucleotide.

45. A method of producing a microparticle composition, the method comprising:

providing a microparticle by an emulsification process, said microparticle comprising: (a) a polymer selected from the group consisting of a poly(α-hydroxy acid), a polyhydroxy butyric acid, a polycaprolactone, a polyorthoester, a polyanhydride, and a polycyanoacrylate; and (b) a first detergent portion that is bound to the polymer; and

adsorbing a complex of a biologically active macromolecule and a second detergent portion on the surface of the microparticle;

wherein the first detergent portion and the second detergent portion comprise the same detergent or different detergents, and wherein the biologically active macromolecule is selected from the group consisting of a polypeptide, a polynucleotide, a polynucleoside, an antigen, a pharmaceutical, a hormone, an enzyme, a transcription or translation mediator, an intermediate in a metabolic pathway, an immunomodulator, and an adjuvant.

46. The method of claim 45, wherein the first and second detergent portions comprise the same detergent.

47. The method of claim 46, wherein the polymer comprises a poly(α-hydroxy acid) selected from the group consisting of poly(L-lactide), poly(D,L-lactide) and poly(D,L-lactide-co-glycolide), wherein the first and second detergent portions comprise a cationic detergent, and wherein the biologically active macromolecule is a polynucleotide.

48. The method of claim 47, wherein the first detergent portion that is bound to the polymer comprises about 10-90% of the total detergent in the composition, and wherein the detergent corresponding to the first and second detergent portions is added in the course of the emulsification process.

49. The method of claim 48, wherein the emulsification process comprises:

(a) emulsifying an organic phase comprising the polymer and the organic solvent with a first aqueous phase comprising water to form a water-in-oil emulsion; and

(b) emulsifying a second aqueous phase comprising the detergent and water with the emulsion formed in step (a) to form a water-in-oil-in-water emulsion.

50. The method of claim 48, wherein the first detergent portion that is bound to the polymer comprises about 10-60% of the total detergent in the composition.

51. The method of claim 50, wherein the cationic detergent is CTAB.

52. The method of claim 45, wherein the first detergent portion comprises a first detergent and the second detergent portion comprises a second detergent differing from the first detergent.

53. The method of claim 52, wherein the first detergent is added in the course of the emulsification process and the second detergent is added subsequent to the emulsification process.

54. The method of claim 53, wherein the second detergent is added concurrently with the biologically active macromolecule.

55. The method of claim 53, wherein the polymer comprises a poly(α-hydroxy acid) selected from the group consisting of poly(L-lactide), poly(D,L-lactide) and poly(D,L-lactide-co-glycolide), wherein the first detergent comprises a nonionic detergent and the second detergent comprises a cationic detergent, and wherein the biologically active macromolecule is a polynucleotide.

56. The method of claim 55, wherein the first detergent is PVA and the second detergent is CTAB.

57. The method of claim 45, wherein the polymer is a poly(D,L-lactide-co-glycolide) having a lactide/glycolide molar ratio ranging from 40:60 to 60:40 and a molecular weight ranging from 30,000 Daltons to 70,000 Daltons.